Light and Lighting

Official Journal of the Illuminating Engineering Society.

Incorporating "The Illuminating Engineer."

32, Victoria St., London, S.W.1.

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Vol. XXXV.—No. 5 | May, 1942 | PRICE NINEPENCE Subscription 10/6 per annum, post free

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Economy in Light?

ILLUMINATING engineers are well aware that for most purposes we do not get even now, nearly all the light we need.

They are therefore apt to view with disfavour suggestions for wholesale economies in lighting such as the threatened Fuel Rationing Scheme may bring in its train.

Certainly where we know that the available illumination is scarcely adequate we may well be reluctant to make reductions—unless the need is dire indeed. In factories engaged on work of national importance, urged to attain the greatest possible output, who could willingly curtail the illumination on which efficient production so vitally depends?

Yet it is well to remember that there is a form of economy to which all illuminating engineers are pledged—the elimination of waste in the form of light unwisely and even prejudicially applied.

It is still possible for us, on occasion, to make "one candle do the work of two," to make sure that no light is squandered and that all serves its appointed purpose.

I.E.S. Annual General Meeting

The I.E.S. Council had an encouraging record to present at the recent annual meeting on May 12. To have received over 250 applications for membership and to have held nearly fifty meetings during its third "war session" is surely remarkable evidence of the vigour of the society. It also illustrates the wisdom of the policy of encouraging the formation of Centres and Groups, which are already making a substantial contribution to the annual programme. It would appear that for the moment a more or less stable position has been reached in regard to A.R.P. lighting problems—though the possibilities of useful service by the Society in this connection have by no means been exhausted. The past session has accordingly been devoted to lighting reconstruction problems as foreshadowed in Mr. Ackerley's address a year ago. No apology need be made for embarking upon this survey at the present time. It would certainly be too late to defer consideration of these important questions until the moment when peace is restored. The annual meeting was followed by an address by Mr. G. H. Wilson on "Street Lighting, Past, Present, and Future," delivered in his inimitable style, which was heard with great interest, and of which we hope to give some particulars in our next issue.

American I.E.S. and National Defence

As we anticipated, the I.E.S. in the United States is taking active steps to co-operate with defence organisations. Already four Sections and Chapters have established contact with the authorities. It is stated, for example, that the New Orleans Chapter has agreed to act as a "Black-out Advisory Committee," and has formulated requirements at the request of the local Office of Civilian Defence, by whom they are being printed and distributed. No doubt such action is more easily taken in America where the black-out problem differs essentially from our own, and where apparently each State considers its own requirements. As is well known, the Society in this country has been very active in carrying out researches and making recommendations behind the scenes. We have always regretted, however, that the services of its members have not been fully exploited in an advisory capacity in connection with the putting into operation of the black-out. Their assistance might help to solve what is really a crucial problem in connection with the existing Order, viz., reliance on precise definitions and measurement of brightness. With its growing series of local Centres and Groups the Society would now be in a better position to render assistance and there must still be many localities where the authorities on the spot would benefit by expert advice.

Colorimetry

The North Midland Centre held a successful meeting in Leeds on March 9, when Mr. F. L. Warburton, of the Wool Industries Research Association, read a paper on "Colorimetry."

After referring to the early efforts of Newton and Thomas Young to reduce the spectral colours to terms of clearly defined types of radiation (known as primaries or spectral stimuli), the author described the recent work of Wright and Guild. He then referred to the necessity of defining the properties of a standard observer and to the efforts of the International Commission on Illumination in this direction. The effects of scotopic vision, temporal induction and after-images were then dealt with in relation to colour-matching, and the author concluded with a reference to visual discrimination.

In the ensuing discussion Mr. J. H. Mollan pointed out that the whole basis of Colorimetry depends on the response of the human eye. The method of defining a colour in terms of a mixture of "white" light and a monochromatic radiation had practical advantages over the trichromatic method. Dr. St. Clair Stockwell asked if the author had met with the condition of "blue blindness" among colour-blind persons and whether pure colours actually existed. Mr. H. E. Goodson asked why a potassium flame, when viewed through a blue glass filter, appears red; also whether the author could define the colour known as "puce."

In his reply the author agreed that the accepted standard for the average eye represents the mean of data for relative few observers. Yet a colour match for the standard observer is likely to be more acceptable to a random group of observers (not colour blind) than would a match for any real observer. The monochromatic plus white system had advantages, but accurate results can only be obtained on the trichromatic system. Hence the latter system is normally used and conversion is carried out when required. He had no experience of blue blindness, although cases had occurred. Pure colours were rarely met in nature, with the exception of yellows. With regard to the colour of the potassium flame, the author stated that the usual blue filters transmit red as well as blue. He regretted that he was unable to define the exact composition of the shade termed "puce."

Blue Light and the Black-out

During the period following the outbreak of war the impression was prevalent that blue light is relatively inconspicuous when viewed from above. The matter was explored by the I.E.S., and this belief was shown to be erroneous.* In general white light is both the best and the easiest to use for weak general lighting. One obvious consideration is that the general use of blue lacquers, etc., involves great absorption and is therefore very wasteful. There have been, nevertheless, references in the Press to the use of blue light in "black-outs" abroad. It is of interest, therefore, to note a contribution by Dr. M. Luckiesh†, whose view coincides with that of experts here. He recalls that blue light was in fact used by the U.S.A. Navy at one time during the last war, but only as a quick and acceptable means at the moment of dimming existing lights. Dr. Luckiesh points to the Purkinje effect, in virtue of which blue tends to "outlive" other colours as the intensity is reduced, and to the high sensitiveness of the periphery of the retina to faint blue light as drawbacks so far as inconspicuousness is concerned. At close range, he adds, blue light is undesirable because normal eyes find it difficult to focus objects illuminated by such light when they are at a distance of a few feet or more.

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* Trans. Illum. Eng. Soc. (London), Oct., 1941, p. 121.

† "Illuminating Engineering," Feb., 1942, p. 113.

Press Shop—Old Lighting

Press Shop—New Lighting.

Factory Lighting

An interesting gas lighting installation has recently been fitted in a factory engaged on war work in the London area, and the photographs illustrate the improvements that have been effected. They show particularly how "comfort" conditions have been improved by the suppression of glare.

The general lighting is afforded by 128 6-mantle industrial lamps, each fitted with a catalytic igniter. The lamps are mounted 11 feet above floor level, at 10 feet intervals in rows 12 feet apart, so that the spacing/height ratio is approximately 1:1. The installation was planned to provide service illumination of 12 ft.c. on the horizontal plane 3 feet above floor level, and a test carried out two months after installation revealed an average illumination in excess of 13 ft.c., with a diversity factor of less than 1.5.

Additional lighting is provided by approximately 50 local lamps, each fitted with one mantle and a concentrating reflector and mounted on a flexible arm, enabling light to be projected in the required direction upon work in lathes, presses, etc. The illumination "on the work" provided by these fittings in every case exceeds 30 ft.c., which provides a reasonable margin over the standards recommended in the I.E.S. Code.

The heat from the lamps enables a considerable saving to be made in the consumption of fuel for heating the factory in cold weather, and under blackout conditions in hot weather two extractor fans assist ventilation.

The management of the factory have stated that "the new lighting arrangement appears to be very satisfactory indeed," and that they were very pleased with the manner in which the Gas Company concerned carried out the installation.

Soldering and Fitting Shop—Old Lighting.

Soldering and Fitting Shop—New Lighting.

An Illuminating Engineering Survey

(Specially contributed)

In what follows we present the first portion of a survey of the series of papers presented at the 1941 Convention of the American I.E.S. and published in *Illuminating Engineering* (Dec., 1941). A list of these papers appeared in our March issue, pp. 36-37.

Twentieth Century Lighting Practice

Mr. Preston S. Millar, in his paper "The Twentieth Century Evolution of Lighting Practice," outlines the growth of the illuminating engineering movement and emphasises the fact that illuminating engineering calls for a high degree of skill and long experience. Not a few members of the profession in this country will applaud him when he says that "Many, because they can perceive the more obvious effects of light, feel competent to discuss the subject of illumination. . . . The illuminating art suffers from words and acts of people who presume to provide lighting equipment or to pronounce judgment regarding lighting without either adequate knowledge or independent investigation."

It would appear from the paper that the introduction of the fluorescent lamp has caused this trouble to assume quite a serious aspect in the U.S.A. at the present time. One speaker in the discussion said that "an enormous field of self-styled experts has sprung into being to exploit the new 'current-saving' marvel —throwing it at the public as the answer to all lighting ills." Mr. Millar points out that the proper use of this new tool in lighting demands special equipment and, in general, results in better illumination rather than in a saving of cost. "Only experienced, competent lighting specialists," he says, "can design and instal really satisfactory fluorescent lighting."

As an example of what can be done to take full advantage of the accumulated experience of experts, Mr. Millar cites the I.E.S. portable lamp. Even the most inexpert can get good results with such equipment, and "they are a source of gratification to all who have anything to do with them."

In a lengthy contribution to the discussion on Mr. Millar's paper, Mr. G. Ainsworth advocates that indoor lighting installations should be designed so as to simulate the general distribution of brightness in the visual field which is commonly provided by Nature out of doors.

Visual Efficiency

The paper entitled "The Anatomy of Visual Efficiency," by Mr. H. L. Logan, seems to have raised an unusually heated discussion. (Probably this accounts for a special footnote drawing attention to the normal disclaimer of responsibility on the part of the Society.) The almost universal criticism is scarcely surprising, seeing that the author devotes the first section of his paper to putting forward the thesis that occular discomfort is seldom due to any fault in the lighting, but generally to various pathological, psycho-pathological, or optical conditions, which "primarily require ophthalmological, medical, or educational correction. Attempts at engineering correction can be aimed only at symptoms and cannot reach the true cause."

The remainder of the paper is less contentious. It describes the conditions, as far as they affect visibility, met with in natural fields of view and then those found in various artificially lighted fields of views. Finally, a method is described for applying the results of these studies in the design of artificial lighting installations. This method is worked through in a particular example, and after studying it the reader is inclined to endorse the author's remark, "It is simple but tedious."

The discussion, as already mentioned, was far from tame, and at times seems to have been tinged with acrimony. In particular a criticism of the rate of blinking as a measure of ocular discomfort raised the ire of Dr. M. Luckiesh and Mr. F. K. Moss, but the author stoutly maintained his position and not only said that, in view of the findings of another authority (which he quoted), "Dr. Luckiesh's 5,000 *five-minute* experiments are apparently worthless," but concluded his reply with a bibliography of papers on the subject of blinking.

"Comfortable Lighting"

Drs. Ward Harrison and M. Luckiesh read a paper on "Comfortable Lighting," applying the term to an installation regarded as a whole and not only to the region adjacent to the visual task. They made a number of recommendations, among them the following:—

(a) The illumination on a vertical plane through the eyes should not exceed one-quarter of that on a horizontal plane

at the work; (b) brightness ranges should be kept down to 10 : 1 or thereabouts and should never exceed 50 : 1; (c) the illumination needed for easy seeing is generally considerably above that at which optimum rate of working is achieved; (d) owing to the prevalence of shiny surfaces indoors the brightness of light sources, *as seen from the work*, should be as low as possible and generally should not exceed 2,000 to 2,500 ft.-lamberts; for work on highly-polished sheet metal the limit is about one-fifth of this. These values are based on the assumption that the illumination is 50 ft.c. or more; the higher the illumination the less the deleterious effect of a given brightness. The paper concludes with a chart to facilitate the appraisal of a lighting system on the basis of the four factors which are set out above as being those which determine whether an installation is "comfortable" or not.

Glass Blocks in Building

If the use of glass blocks becomes at all common for such structures as schools, much research of the kind described by Messrs. G. M. Rapp and A. H. Baker, in a paper entitled "Daylight Illumination on Interiors Fenestrated with Glass Blocks," will be needed. These workers used a portable building 28 ft. square and 12 ft. high, mounted on castors running on a circular track, so that it could be moved to any desired orientation. Four different types of fenestration material were used for the four sides, each containing a window 24 ft. wide by 8 ft. high, only one window being exposed at a time. The interior illumination on the working plane was measured at twenty-five points by means of a photo-cell, and the simultaneous outdoor illumination was measured, also photo-electrically, under each of four conditions, viz. (a) from a quarter-sphere of sky on a horizontal surface (giving the sill-ratio); (b) from the complete hemisphere (giving the daylight factor); (c) from a quarter-sphere of sky on a vertical surface; and (d) by means of an integrating sphere with its opening in the plane of the fenestration. Condition (b) was abandoned, and it was found that (d) gave the most consistent results. The paper gives series of illumination curves for four different types of glass blocks and for a steel sash window, both unshaded, and when shaded with roller shades or with Venetian blinds. Workers on the subject of daylight in this country will be interested to learn that the sill-ratio "has been repudiated as a reliable comparator by its inventors," two American authors (*sic*).

Airport Lighting.

Although the paper by Mr. F. C. Breckenridge is entitled "Airport Lighting in the United States and Europe," it is chiefly devoted to describing European practice rather than American. The author attended the meetings of the I.C.I. in 1939 and took the opportunity to visit airports in Holland, France, Germany, Switzerland, Italy, Eire, and Great Britain. He begins his paper with the remark that "Two facts stand out from a comparative survey of airport lighting in the United States and Europe: the similarity of the functions performed by the lights, and the dissimilarity of the means adopted to perform these functions." An outstanding example is the use of approach lights. These are in operation at 13 U.S. airports, whereas such systems as the author saw in Europe were in every case experimental. A standard arrangement for these lights is proposed in the paper. The author sums up his survey by saying that, while the individual units in European equipment are often more efficient than those used in the States, the results are no better, because the American equipment, having been designed for quantity production, is available in greater abundance. "Not many airports in Europe," he says, "have adequate quantities of the best equipment."

Traffic in Blackouts.

In a paper entitled "Visual Aids to Traffic Movement under Blackouts," Messrs. W. S. Everett and Kirk M. Reid describe some experiments in a blacked-out area of some four square miles, situated 15 m. S.E. of Cleveland. The actual test area was 1,000 ft. square and enclosed a portion of a state highway equipped, for the purposes of the test, with two systems of street-lighting, described in an Appendix to the paper. The c.p. distribution curves of the fittings were somewhat similar to those specified in BS/ARP 37, and the average illumination provided was of the same order, but in one system it could be raised, by voltage control, to 0.01 ft.c. Roadway delineators of three different kinds were used. Aerial observations were made of these systems, with the road surface (worn concrete) both wet and dry and of five different types of headlight on moving vehicles. Certain systems of so-called "brightness camouflage" were also tried. These consisted of patterns of steady or fluctuating glare

sources distributed over the test area. The possibilities of this method of concealing military objectives were elaborated by A. F. Dickerson during the discussion on the paper. Details of the results obtained from the trials are naturally withheld.

Polarised Headlamps

The use of polarisation to solve the problem of glare from motor-car headlights has come within the realm of practical politics since the introduction of polarisers in sheet form, such as "polaroid." This subject is dealt with in a paper, "Seeing with Polarised Headlamps," by Messrs. V. Roper and K. D. Scott. The authors discuss the need for much higher beam candle-powers, not only to compensate for the reduction of intensity due to polarisation, but also to make up for loss of contrast due to the fact that the light reflected from dark objects remains polarised to a much greater extent than that reflected from light objects. They conclude that the candle-power (before polarisation) must be about $3\frac{3}{4}$ times the present c.p. of unpolarised headlamps for equal ease of seeing under "clear-road" conditions. They discuss a number of other problems, including the relative advantages of having the analyser in the form of spectacles or as a visor on the windscreen.

In the course of the discussion, reference was made to a new polarising material which is not a crystal suspension, but a true polarising plastic that can be formed directly on the surface of the headlight lens.

Street Lighting and Public Safety

A paper on "Public Safety in Detroit as Affected by Street Lighting" was read by Mr. L. T. Schrenk, who has contributed a number of papers on this subject to the American I.E.S. at different times in the past. The first part of the paper is largely statistical. From his results the author concludes that the American I.E.S. Code of "Recommended Practice of Street Lighting" needs modification, and that all traffic thoroughfares should have an illumination of at least 0.8 ft.c. The latter half of the paper is almost entirely devoted to a description of a new street lighting fitting for residential areas. It is a reflector-refractor fitting giving an asymmetric distribution with its peak at 78 deg., directed along the axis of the roadway. The c.p. at this angle is about 3,300, using a 6,000-lumen lamp. With central suspension over a 30-ft. roadway, a mounting height of 25 ft., and a spacing height ratio of 12:1, it gives an average illumination of 0.2 ft.-c.

Planning Street Lighting

A very comprehensive paper on "Planning a Street Lighting Installation," by Mr. A. J. Sweet, deals with the subject on the basis of providing safety on the streets at night. Accident statistics show that "the public pays for adequate street lighting whether it gets it or not." The author urges that the lighting of a town or district should be based on what he terms a "master" plan. This is a forward-looking schedule of streets classified by traffic density, each class having assigned to it a system of lighting based on a "Table of Recommended Practice" (reproduced below). The

TABLE OF RECOMMENDED PRACTICE.

Street Classification.	Maximum Vehicles per hour in both directions (Night Traffic only).	Mounting Height.		Arrangement between Intersections.	Spacing.			Lamp Size in Lumens.		Horizontal Distance of Lamp from Tree Line (but see Supplementary Note 9).
		Centre-mounted Units at Intersections.	Side-mounted Units between Intersections.		Average.	Maximum.	Minimum.	At Intersections.	Between Intersections.	
Very Light Traffic Street	Less than 150	25 ft.	20 ft.	Staggered	Approx. 140 ft.	160 ft.	120 ft.	4,000	2,500	At Least 9 ft.
Light Traffic Street	150—500	25 ft.	24 ft.	Staggered	Approx. 165 ft.	200 ft.	140 ft.	6,000	6,000	At Least 16 ft.
Medium Traffic Street	500—1,200	$27\frac{1}{2}$ ft.	$27\frac{1}{2}$ ft.	Staggered	Approx. 165 ft.	200 ft.	140 ft.	10,000	1 ,000	At Least 16 ft.
Heavy Traffic Street	1,200—2,400	—	$27\frac{1}{2}$ ft.	Opposite	Approx. 165 ft.	200 ft.	140 ft.	—	10,000	At Least 16 ft.
Very Heavy Traffic Street	Over 2,400	—	33 ft.	Opposite	Approx. 165 ft.	200 ft.	140 ft.	—	15,000	At Least 16 ft.

Classification.	Abutting Property.	Mounting Height.	Arrangement (Units Centre-mounted).	Spacing.			Lamp Size in Lumens.
				Average.	Maximum.	Minimum	
Alleys	Business or Industrial	25 ft.	At all Alley Intersections. Elsewhere at Recommended Spacing	200 ft.	225 ft.	175 ft.	2,500
	Residential	20 ft.		160 ft.	180 ft.	140 ft.	1,000

average annual cost of such installations is estimated to be in the region of 30 cents per linear foot of roadway. Even the full plan provides barely adequate lighting for safety, but it is pointed out that average expenditure at the present time is only about 15 cents per annum. The author therefore recommends that, while the master plan should in no way be watered down as a whole, certain reductions may be made as a temporary measure. He indicates those which can be effected without prejudicing in any way the full operation of the plan at a future date.

In a supplementary section of the paper he proposes a scheme for two-intensity lighting based on a slight overrun of the lamps until 11 p.m., and then a compensating underrun to dawn. This gives 20 per cent. more light than the design value at the busy period without any reduction in the life of the lamps.

(To be concluded.)

Street Lighting, Past, Present, and Future

At a meeting of the I.E.S. Bath Group on April 7, Mr. G. H. Wilson gave an address on the above subject—which may be regarded as a sort of rehearsal for the sessional meeting in London on May 12. In reviewing progress during the period 1928 to 1938, Mr. Wilson referred specifically to the British Standard Specification, the introduction of sodium and mercury vapour lamps for street lighting, and to researches on road surface reflection and other important factors in relation to visibility. This led up to a reference to the M.O.T. Departmental Committee, which reported shortly before the war, and to the present stage of war-time street lighting. The final section of the address briefly reviewed post-war possibilities, and the hope was expressed that due regard to street lighting would be paid in connection with reconstruction.

There was a good discussion, in which Mr. J. Owens, Mr. J. B. Harris, Mr. A. Faulkener, and Mr. F. T. Bennell took part. Votes of thanks to the author, moved by Mr. W. Bowler, chairman of the group, and to the Bath Electricity Corporation for their hospitality, proposed by Mr. T. Catten, terminated the proceedings.

(Mr. Wilson's address will appear in due course in the I.E.S. Transactions.)

"The Eye"

Experience of the black-out has led to a general growth of interest in visibility problems, and there have been quite a number of addresses dealing with the human eye at recent meetings of the Illuminating Engineering Society.

On Friday, April 10, Dr. Mitchell, Chief Medical Officer, City of Birmingham Education Department, speaking in an unofficial capacity, gave a most interesting and instructive lecture entitled "The Eye," before a meeting of the I.E.S. Midland Centre.

After dealing at some length with the construction of the eye, and the functions of the various parts, an explanation of long sight, short sight, and astigmatism was given. Having stated that seeing is a partnership of vision and light, the lecturer then proceeded to explain the co-relation of these two factors. Special emphasis was given to the fact that the yellow spot is the point of greatest acuteness of vision and is capable of perception of very fine detail. To take full advantage of this feature high values of illumination on the visual task are necessary, and it was emphasised that tests of short duration may give misleading results as to the efficiency of the eye at low values of illumination.

Dr. Mitchell then dealt with the accommodation of the eye, with particular reference to the black-out, and explained how peripheral vision is utilised under such conditions.

The value of the lecture was emphasised by a very lively discussion, to which Dr. Mitchell suitably replied.

National Illumination Committee

Annual General Meeting

The annual meeting of the National Illumination Committee took place on March 10, at 2 p.m., in the House of the Royal Society of Arts, London.

The address of the chairman (Lt.-Col. Kenelm Edgcumbe) on this occasion was inevitably brief, as under present conditions the international consideration of illumination is at a standstill. The committee, however, is keeping its machinery in being and is utilising present contributions in building up a fund which may prove useful in time to come.

The death of M. Filliol was noted with regret, and it was agreed to send an appropriate message through the Swiss National Committee, of which he was chairman.

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Literature on Lighting

(Abstracts of Recent Articles on Illumination and Photometry in the Technical Press)

(Continued from p. 50, April, 1942)

PHOTOMETRY

51. Illumination Measurements with Light Sensitive Cells.

C. L. Dows. Am. Illum. Eng. Soc. Trans., pp. 103-112, 2, Feb., 1942.

The problems of producing a rectifier-type photoelectric cell with a response corresponding to the visibility curve of the human eye are discussed. A multi-cell, colour-corrected unit with an unusually good cosine response is described.

J. S. S.

52. Microphotometer.

Anon. Review of Scientific Instruments, Vol. 13, No. 1, Jan., 1942.

A description is given of a new microphotometer designed for rapidly analysing spectrographic plates. It consists of a scanning unit and a recording unit. The scanning unit holds the spectrogram and scans it with a narrow, focused beam of light. The transmitted beam falls on a photo-cell which produces a current varying with the density of the spectrum. This current operates the recording unit, which produces a trace by pen and ink on a strip chart.

W. E. H.

SOURCES OF LIGHT AND LIGHTING EQUIPMENT

53. A New Source for Infra-red Spectrometers.

Lincoln G. Smith. Review of Scientific Instruments, Vol. 13, No. 2, Feb., 1942.

A new source for infra-red spectrometers consisting of a carbon rod heated electrically in vacuum is described. The rod provides a source whose brightness is comparable with that of a Nernat glower, but which may be made of greater width and which is much less delicate and less easily burned out.

W. E. H.

54. Properties of Urea Plastics in Lighting Fixtures.

R. B. Barnes, C. R. Stock. Am. Illum. Eng. Soc. Trans., pp. 89-102, 2, Feb., 1942.

Data are presented on the effect of temperature on the reflectivity and the colour of urea plastics. The control of transmission, reflection, and diffusion by the incorporation of pigments in the medium is discussed.

J. S. S.

55. Drying Lamps.

Anon. Review of Scientific Instruments, Vol. 13, No. 2, Feb., 1942.

A brief description is given of a new 250-watt reflector heat lamp for therapeutic use, which produces considerably less glare than present lamps, having a filament operating temperature of 2,000 deg. K. instead of 2,500 deg. K.

A new 100-watt infra-red drying lamp is also described.

W. E. H.

56. The Optical Properties of Diffusing Materials.

Seibert Q. Duntley. Journal of the Optical Society of America, Vol. 32, No. 2, Feb., 1942.

A mathematical treatment of the optical properties of diffusing materials is given in terms of surface reflection factors, absorption, and scattering coefficients. Practical methods for measuring the optical constants of samples are described, and the author makes particular reference to plastics.

H. J. T.

APPLICATIONS OF LIGHT

57. Light and Architecture.

Anon. Am. Illum. Eng. Soc. Trans., pp. 77-80, 2, Feb., 1942.

Some representative architectural lighting schemes are described with photographs.

J. S. S.

58. Vision and Seeing under Light from Fluorescent Lamps.

M. Luckiesh, F. K. Moss. Am. Illum. Eng. Soc. Trans., pp. 81-88, 2, Feb., 1942.

Measurements of visual acuity, rate of blinking, and involuntary eye movements indicate that there is no difference in ease or comfort of vision with tungsten filament and fluorescent lamps.

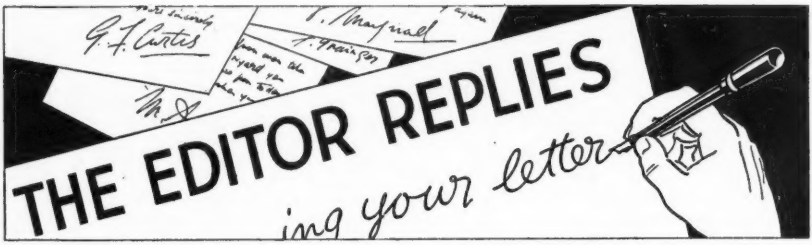
J. S. S.

59. Paint Baking with Infra-red Plus Ultra-violet.

H. J. Bennett, H. Haynes. Am. Illum. Eng. Soc. Trans., pp. 115-117, 2, Feb., 1942.

Tests indicate that ultra-violet radiation accelerates surface drying, but any advantage is offset by wrinkling tendencies. The rapid infra-red thermal effect overshadows the effect of ultra-violet.

J. S. S.



The discussion of the treatment of **dimly lit stairways** in our last and previous issues has brought a letter from Mr. L. H. McDermott, who draws attention to a device originated by Mr. H. E. Beckett, of the Research Department of the Ministry of Home Security.

The method consists in painting both sides of the treads with alternatively wide and narrow white bands, respectively 6 in. and 3 in. in width. Anyone descending a flight of stairs thus treated sees two white strips with jagged edges of a regular pattern which at once arrests the eye and gives an indication where the edges of the stairs are situated. This has proved very helpful to persons descending dimly lit stairways. It is unusual to fall *upstairs*, though I *did* hear a well-known I.E.S. member recently confess to injury occasioned by so doing. It may be noted, therefore, that the device is also helpful to persons ascending—especially if a strip is painted on each riser of the same width as that on the tread below.

There have, of course, been comments on the **Fuel Rationing Scheme** which, as anticipated, has excited opposition in Parliament and elsewhere. A point of principle of some importance is raised in the view expresed by one reader: that such steps as the extinguishing of alternate lights (or even two in three) in carriages on the Underground may be useful because they inevitably attract attention, cause some inconvenience, and remind people of the need for economy —even though the actual saving effected may be trivial.

To the scientist, however, this argument does not greatly appeal. If the saving accomplished is really worth the inconvenience caused, well and good. But if it is negligible a false impression is being created—people are also being led to acquiesce in lighting arrangements that are definitely faulty and possibly to infer that normal lighting is extravagant, and that diminution or interference with it does not greatly matter. This is an impression which illuminating engineers must naturally contest.

The two papers on fluorescent lighting dealt with in our last issue (pp. 45 and 46) raise many interesting points. I have been asked whether truly **"shadowless" conditions** *can* exist—at all events on this earth. I rather doubt whether they can. Even if there is no evident shadow the interposing of the body or some other opaque object must always dimininsh the available illumination in some degree. At a point in space, if the source of light consisted of evenly bright distant surroundings we would approach nearest to a shadowless condition. The closest equivalent on this earth is perhaps the centre of an integrating sphere—provided no object of substantial size is introduced.

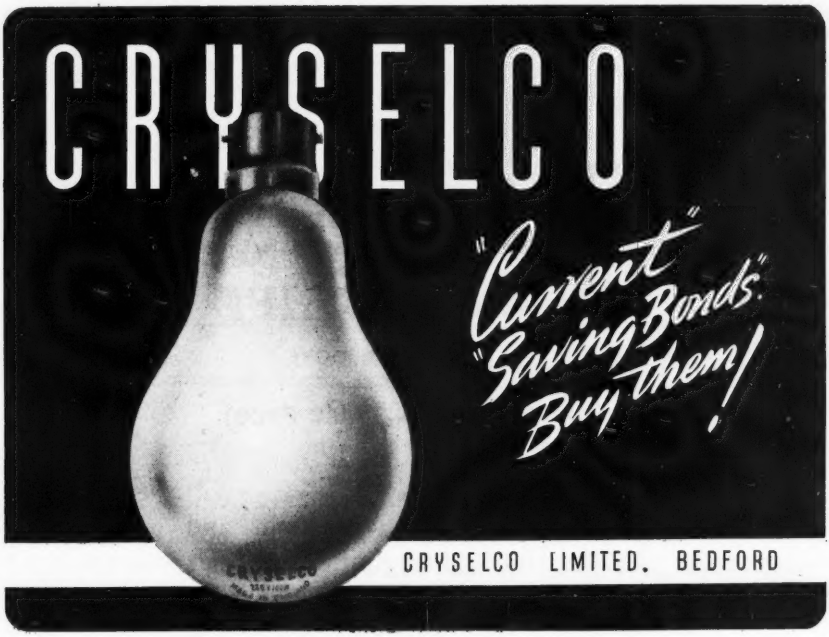
One point by which I was impressed in connection with Mr. Aldington's paper

was the value of **fluorescent effects in demonstrations.** Their advantage in yielding extra brightness and contrast has often been remarked—for example in displaying photographs and in imitating gleaming metal. On this occasion the presentation of spectra by means of diagrams executed in fluorescent paint on black paper was far more vivid in effect than a lantern slide. Not only do the spectra stand out better, with a definite suggestion of the emission of light, but one can imitate the actual colour of the lines and give a roughly correct impression of the difference in linear and continuous spectra.

I have also heard the suggestion that **lantern slides and films** should be projected on to a **screen coated with fluorescent material,** the projector emitting a beam of "black light," i.e., ultra violet radiation. I do not see any material advantage here, as the projection of a lantern slide or film by aid of visible light gives us all the contrast we need. It is possible, however, that in certain cases fluorescence confined to a certain colour, e.g., yellow or green, might give clearer definition. It might also be claimed that from the standpoint of the audience a beam that was invisible or nearly so, is advantageous. It would be necessary to ensure that an adequate screen brightness could be attained and a suitable source of ultra violet radiation available. Perhaps the latest type of super high-pressure mercury vapour lamp, suitably screened, might answer.

I have been asked to say a word or two about the **examinations** of the City and Guilds Institute in **Illuminating Engineering.** The initiation of this examination was a step of great importance, affording for the first time a definite indication of proficiency in this new field. It is a pity that the entries recently have been so few. War-time conditions are doubtless mainly responsible. One can hardly expect many entries from young men about to be claimed by the Forces. But there is no reason why the examination should be regarded as intended only for those at the outset of their career. There are many older men who would do well to take the examination, and I hope that firms in the lighting industry will encourage members of their staffs to do so. The lack of specific courses of instruction at the present time is a difficulty, but the questions should not prove too formidable to those with some years of practical experience of illuminating engineering behind them. In our March issue (p. 38) we gave some indication of the nature of questions set. It might be a good thing to issue a leaflet explaining the nature of the examination and containing specimens of past papers —so that all those in the lighting industry could form an idea what they would be "up against" if they decided to try their luck.

I have some sympathy with the view that **signs** are now regarded too much as things to be suppressed and too little as valuable media for giving information. Illuminated signs have ceased to be. Name plates and signposts have vanished. Yet little organised use is made of signs in some situations where they would be invaluable. An instance, mentioned in *Signs*, is in bombed cities, where much time is often lost in establishing contact with concerns in damaged areas. Why, it is asked, are there not available **standard placards** on which the continued existence of businesses or their whereabouts can be quickly indicated?



Further instructive data on **Road Accidents** have appeared in the April issue of *Safety News*, the journal of the Royal Society for the Prevention of Accidents. Aggregate figures for all road users show a welcome reduction. The first seven months of the third year of war will show an average decrease of some 200 deaths a month. In this respect the trend of events is similar to that during the last great war, when a great initial increase in accidents was followed by a substantial diminution later.

It is, therefore, all the more remarkable that the proportion of **accidents to adult pedestrians during the black-out** is still so high. Thus in January, 1942, for which month the accidents are analysed in detail, the accidents to adult pedestrians during daylight were 77, as compared with 106 in 1941—a decrease of about 30 per cent. There were, however, still 285 adult pedestrians killed during darkness, as compared with 296 in 1941—a decrease of only about 3 per cent. It looks, therefore, as though no marked improvement has been effected here, and it is surely significant that nearly four times as many adult people should be killed in darkness as in daylight, in spite of the fact that so few pedestrians habitually use the streets by night.

May I conclude by recording the election, as a Fellow of the Royal Society, of **Dr. C. C. Paterson,** a crowning distinction following upon the many other honours he has received and one that will give pleasure to all those associated with Illuminated Engineering.

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